



## Patent Application

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## Patent Specification

## Abstract

## Abstract

The present invention has the effect that as to the multicasting service offer method at the MPLS VPN net including an plurality of CEs included in the member network, and a plurality of PEs and a plurality of service supply apparatuses belonging to the service provider network, the traffic load can be reduced in the network of the service provider which transmits packet from the fourth stage which determines by using VRF for the multicasting which the information whether what is that source and multicasting tri of the received packet as described above are set up among the network device connected to the first PE is stored if the received packet is the multicast dragon in the second step: IP information determining in the first PE and determines in the second step or the third step: first PE which determines whether the packet which is received by using the label information is the multicast dragon or not whether it is the unicast dragon or not determines in the first step: first PE receiving the MPLS VPN packet by one first PE among a plurality of PEs whether the header information of the received packet is the IP information or not whether it is the label information and or not determines the receiving path whether the destination location where packet is transmitted is multiple or not whether it is the single or not and the first PE to the route of the related purpose paper after the destination location transmitted as described above reproduces as the number of destination location which transmits packet if it is multiple using the unicast method including the fifth step.

## Representative Drawing

Drawing 2



## Index Term

Multicast, the MPLS VPN, and VRF.

## Specification

### Title of Invention

Method for setting up or releasing a multicast tree between two CE on MPLS VPN and method for providing multicasting service {Method for setting up or releasing a multicast tree between two CE on MPLS VPN and method for providing multicasting service}

### Brief Description of the Drawings

Figure 1 is a structure chart of the MPLS VPN net according to the embodiment of the present invention.

Figure 2 is a flow chart showing the multicast tree establishment and cancellation course according to the embodiment of the present invention.

Figure 3 is a flow chart showing the method of providing multicasting at the MPLS VPN according to the embodiment of the present invention.

### The Detailed Description of Invention

#### The Purpose of Invention

#### Field of Invention and the Prior Art

The present invention relates to the multi-protocol label switching virtual private network (MPLS VPN : MultiProtocol Label Switching Virtual Private Network), particularly, to the method of providing multicasting at the MPLS VPN in which the offer of the multicasting service is available in the service provider network side.

Generally, the multicasting (multicasting) indicates that more than one people user transmits identical data of the constant size to a plurality of users having the constant size.

In this multicasting is the internet network, the public switched telephone network, LAN etc, generally it uses.

But in the conventional MPLS VPN, it supports only the unicasting in which the MPLS packet transmitted from the terminal device of subscriber is transmitted to one destination location. Therefore, after producing the packet transmitted to a plurality of destination locations from the subscriber terminal for multicasting, the multiple unicasting method transmitted with a plurality of destination locations is used.

Therefore, in case of the conventional MPLS VPN net using the multiple unicasting method providing the multicasting service, the traffic load increases. It has the problem of the etc, in which the packet delivery is delayed.

#### Technical Problems to be solved by the Invention

An object of the present invention is to provide the multicast method in the MPLS VPN which cancels the above-described conventional problem, and therefore, can decrease the load of the traffic.

#### The Structure and Function of the Invention (Device)

With one feature for achieving the above-described technical problem, And the present invention is to be equipped with the fifth step which transmits packet from the fourth stage which determines by using VRF for the multicasting which the information whether what is that source and multicasting tri of the received packet as described above are set up among the network device connected to the first PE is stored if the received packet is the multicast dragon in the second step: IP information determining in the first PE and determines in the second step or the third step: first PE which determines whether the packet which is received by using the label information is the multicast dragon or not whether it is the unicast dragon or not determines in the first step: first PE receiving the MPLS VPN packet by one first PE among a plurality of PEs as to the multicasting service offer method at the MPLS VPN net including an plurality of CEs included in the member network, and a plurality of PEs and a plurality of service supply apparatuses belonging to the service provider network whether the header information of the received packet is the IP information or not whether it is the label information and or not determines the receiving path whether the destination location where packet is transmitted is multiple or not whether it is the single or not and the first PE to the route of the related purpose paper after the destination location transmitted as described above reproduces as the number of destination location which transmits packet if it is multiple.

Moreover, with the other feature for achieving the above-described technical problem, And the present invention is to be equipped with the transmitter registration acknowledgement step which after the signal received from the first PE determines the signal acknowledgement for multicast as to the multicast tree establishment / termination method at the MPLS VPN net including an plurality of CEs included in the member network, and a plurality of PEs and a plurality of service supply apparatuses belonging to the service provider network in the receiver request stage: second PE receiving the receiver registration / termination requirement signal which requests to be canceled in the second PE connected to the second CE from the first PE connected to the first CE to the receiver of the multicast population with the registration /, it terminates the third CE in the receiver request stage: second PE receiving the transmitter registration / termination requirement signal which the receiver registration / termination step: receiver registration acknowledgement step: second PE informing the registration / termination fact by the first PE in the second PE requests terminates the first CE to the receiver of the multicast population with the registration / to be canceled from the third CE to the transmitter of the multicast population with the registration / to the transmitter of the multicast population with the registration / and informs the registration / termination fact by the third CE between the third CE and the first CE in the multicast tree establishment / termination step: terminating multicast tree with the establishment / and the second PE.

The method of providing multicasting at the MPLS VPN according to the embodiment of the invention done with reference to less than, and the drawing attached is explained.

Figure 1 is a structure chart of the MPLS VPN net according to the embodiment of the present invention.

As shown in Figure 1, the MPLS VPN according to the embodiment of the present invention is equipped with each service edge (Provider Edge: PE1, PE2, PE3) which is connected to (CE1, CE2, CE3, CE4) it is the service provider network (N5) in each visitor it is comprised of (Customer Edge: CE1, CE2, CE3, CE4) or subscriber terminals (1, 2, 3, 4), and it is in the visitor corresponding to the subscriber terminal in the member network (N1, N2, N3, N4) it is made of the member network (N1, N2, N3, N4), and the service provider network (N5), and the service provider device (P1, P2, P3) connected to each visitor edge (PE1, PE2, PE3, PE4).

It was more many than the service edge of the member network, and service provider network and service provider device was generally illustrated in fig. 1. But it showed for the description of the present invention only a part.

Here, it is connected to the subscriber terminal (1) and it makes the address of the destination host in which its own address and packet are the header of the packet received from the subscriber terminal transmitted in packet the included MPLS VPN packet and CE transmits packet with PE connected to oneself.

PE stores the forwarding label table recording each PE on the LSP (Label Switching Path) in which oneself links, and the label information of the next Humulti Strobilus (hop) and CE. And VRF for VRF (VPN Routing and Forwarding instance) for multicasting and unicasting are stored.

Here, in VRF for unicasting, the routing information (the information to be connected indirectly through PE which whether is the direct connection or not has any kind of IP) between the prefix address of CE connected to its own PE and this CE and PE is recorded. Therefore, PE knows whether it will send the packet which is received by using VRF for unicasting to any kind of route or not

And in VRF for multicasting, the information of VRF for unicasting is included. But VRF for unicasting designates the packet transmission to one LSP, it is obvious. The packet transmission to a plurality of LSPs is designated. In other words, VRF for multicasting LSP to a plurality of CEs transmitting packet is set up.

Therefore, it inspects the IP destination address domain of the received packet and if it is the packet for multicasting, it transmits packet with LSP routes of being set up with reference to the multicasting VRF and PE receives the packet in which CE having in the longitudinal spot of LSP which transmits is identical. If it is the packet for unicasting, the packet makes delivered to one destination location CE included in packet with reference to the unicasting VRF.

Here, it can be said to be attach between the packet sender for the multicasting service and the packet receiver the multicast tree (multicast tree) establishment. And this multicast tree establishment is made only when the packet sender and packet receiver required the multicast service. In this way, it is changed to correspond with



the multicast tree in which the content of VRF for the multi-caster team is established if the multicast tree is set up.

In the meantime, as shown in Figure 1, it is comprised. And the present invention relates to the MPLS VPN is the MPLS VPN structure of the BGP-E (Broader Gateway Protocol-Extension) base, and data switching between PE routing is made of the BGP-E base. The routing of the BGP-E base performs routing about the packet in the above case, having the same IP address of the different group. And routing is especially performed the VPN user through the separate VPN VRF table in order to be classified from the existing IP routing. It is not to tell, is already detailed since being the technology of the public notice common.

The process of doing with reference to less than, and fig. 2 and setting up the multicast tree and terminating is explained.

Figure 2 is a flow chart (flowchart) showing the multicast tree establishment and cancellation course according to the embodiment of the present invention. The member network (N1) is to the transmission side. It is the thing of the member network (N2) to the receiving side.

As shown in Figure 2, the CE2 of the receiving side network (N2) delivers the join-des-req message which requests that oneself is registered as CE1 as the multicast receiver.

Thus, the join-des-req message which CE2 transmits is received in PE2. It deciphers the message which is received (S211) and it determines the destination location CE (CE1) and PE2 delivers the join-req message to the PE (PE1) connected to the destination location CE through the MP-BGP (MultiProtocol - Broader Gateway Protocol) multicast extension routing (S212).

Here, in the PE2 through the MP-BGP multicast extension routing, by using VRF stored in PE2, PE1 is confirmed as the destination address included in the header of the join-req message to deliver the join-req message to PE1. It means including the tag knowing thing called the multicast easiness or the corresponding to data (it says to be less than 'use value' this) in the join-req message and transmitting with PE1.

If the join-req message delivered is received in PE2 in PE1, as to PE1, the received message determines from the use value included in the join-req message as the multicasting easiness. And the information of the receiver which accordingly is included in the join-req message is registered in VRF for multicasting.

Next, PE1 delivers the join-conf message which is the response message which gives information to the multicast population to be registered as receiver through the MP-BGP multicast extension routing to PE2 (S213).

Thus, according to the join-conf message which PE2 is received, the join-des-conf message which gives information to the multicast population to be registered as receiver is delivered to CE2 (S214).

Here, when CE2 registered as the multicast receiver in VRF for the multicasting of PE1, if one registered as the multicast transmission person among CE attached to PE1, the multicasting tri is set up between the CE2 registered as the multicast transmission person and the predetermined CE registered as the multicast receiver.

But when CE2 registered as the multicast receiver in VRF for the multicasting of PE1, it becomes the state that is not if one the multicasting tri about CE2 is yet set up among CE attached to PE1 if it was not to register as the multicast transmission person.

The CE1 connected to PE2 in the state that is not if the multicasting tri is set up transmits the join-sou-req message which requests to be registered as PE1 as the multicast service transmitter. The thus the join-sou-req message is received in PE1 (S215).

Here, the join-sou-req message includes the use value informing thing called the multicasting easiness.

And then, it is the multicasting dragon from the join-sou-req message received from CE1 and PE1 reads the information of sender. The information of sender is registered in its own VRF for multicasting. And PE1 transmits the join-sou-conf message which is the response message which informs that CE1 was registered as the transmitter of the multicast population with CE1 (S216).

Therefore, in VRF for the multicasting stored in PE1, CE1 is registered as the multicast transmission person. As CE2 is registered as the multicast receiver, multicast tree are set up between CE1 and CE2 (S217).

As described above, if the multicast tree is set up between PE1 and PE2, the multicast data (that is, the MPLS VPN packet for multicasting) that CE1 transmits is delivered to CE2 to the multicast receiver with the registered other CE.

As described above, in the state where multicast tree are set up between PE1 and PE2, if oneself registered as the transmitter of the multicast population is canceled in the CE1 which is the transmission side, the corresponding to release-sou-req message is generated and oneself transmits with PE1 (S218).

At this time, the release-sou-req message includes the use value informing thing called the multicasting easiness.

Thus, message in which PE1 reads the header of the received release-sou-req message and which are received confirm the message for multicasting. The information of the transmitter edge is confirmed. And the register registered as the transmitter of the multicast population among the content of VRF for the stored multicasting is expunged.

Next, PE1 transmits the release-sou-conf message which informs to be canceled in the transmitter of the multicast population with CE1 (S219).

As described above, if CE1 is canceled in the transmitter of the multicast population, the multicast tree between CE2 and CE1 the canceled state consists of temporary. In this way, if CE1 is canceled in the transmitter of the multicast population, it is not if the multicast packet is transmitted from CE1. And although the multicast packet is generated in CE1, other CEs in which multicast tree were set up in CE1 cannot receive the multicast packet.

In this state, if the release-des-req message which it requests so that oneself registered as PE2 as the receiver of the multicast population be canceled in CE2 is conveyed, it deciphers the received release-des-req message and PE2 determines the signal for the destination information and source information and broad cat. Accordingly the release-req message demanding the multicast tree termination is delivered to PE1 (S220) (S221).

If PE1 receives the release-req message from PE2, after the subscriber registered by VRF for the multicasting reading the header information of the release-req signal and is stored is rescinded in the receiver of the multicast population, the release-conf message which is the response message is delivered to PE2 (S222).

Thus, it generates the release-des-conf message and PE2 transmits with CE2 (S224).

As described above, in CE1, role as transmitter is given up. If role as receiver is given up in CE2, it is recorded in the multicasting VRF in which the information about this is stored in PE1. And the multicast tree between CE2 and CE1 are canceled according to that (S224).

Therefore, as described above, if the multicast tree between CE2 and CE1 are canceled, although CE1 is registered as the transmitter of the multicast population, CE2 cannot receive the multicast packet which CE1 transmits. Furthermore, as described above, it is not if the multicast service is provided between two CEs if multicast tree are altogether canceled with CE1 and CE2.

As described above, the present invention can know following the information of the multicasting VRF stored in PE connected to the multicast tree establishment between two CEs to the transmitter CE of the worn out multicast population. That is, whether LSP between two CEs are connected to the multicasting VRF or not can know in other words following the information which records whether it was canceled or not.

In one description with reference to fig. 2, it did firstly that the receiving side required the multicast service than the transmission side. But the order that this is one embodiment but requiring the multicast service in fact is arbitrary. And the thing, terminating the multicast service moreover, the order is arbitrary.

The method of providing multicasting at the MPLS VPN according to the embodiment of the invention done with reference to less than, and fig. 3 is explained.

Figure 3 is a flow chart showing the method of providing multicasting at the MPLS VPN according to the embodiment of the present invention.

Firstly, it has all PEs with VRF for VRF for multicasting and unicasting. And packet can be received from CE and the packet transmitted from the other PE can be received through the service provider device (P1, P2, P3) in other words.

Here, it illustrates based on PE1.

If PE1 receives the MPLS VPN packet from the adjacent network device (that is, CE1 or P1) (S310), the header of packet is inspected. It determines to be the packet which the information of header transmits from CE1 if it is made of the IP address as a result of inspect (S311)ing. It determines that it transmits from P1 if the information of header is the label information.



Generally, in the MPLS VPN, the prefix IP address of the prefix IP address, about CE and destination location CE are recorded in the header of the packet transmitted from CE with PE. The label of the label about the source PE and next Humulti Strobilus as to the packet, transmitted to PE from P are recorded.

PE1 determines that the header is transmitted from CE1 if the IP address is tested from the header of packet. It determines in other words whether the domain in which the destination IP address is recorded according to that is the multicasting domain or not whether it is the , unicasting domain (S312).

After the destination IP address is recorded in the unicasting domain in the determination (S312), PE1 confirms PE in which packet is transmitted with reference to the VRF (S313) for the unicasting which oneself stores, after obtaining the label of the next Humulti Strobilus and the label corresponding to transmitted PE by using the stored forwarding label table, this is included in the header of packet and it transmits with P1 (S314, S320).

But in the determination (S312), if the destination IP address is recorded in the multicasting domain, PE1 determines in other words whether the destination location where packet is delivered is multiple with reference to the VRF (S315) for the multicasting which oneself stores or not whether it is the single or not. In other words, it determines in other words whether the multicast tree which is set up in the source included in packet is the single or not whether it is multiple or not (S316).

In the determination (S316), if multicast tree are the single, it adheres the label of the destination location and label of the next Humulti Strobilus to the header of packet like the case of the above-described unicast and PE1 transmits packet with the single multicast tree (S317, S320).

But it reproduces as the number of PE1 is the multicast tree packet the multicast tree is multiple in the determinations (S316). The label of the next Humulti Strobilus and the label of complying with for each destination location is adhered to the header of each packet reproduce (S318)ed and packet is transmitted with each multicast tree (S319, S320).

Therefore, the electrical transmission as to the packet, transmitted from PE1 is possible with the related purpose paper (S320).

In the meantime, in the packet check (S311), if it is label to be written at the header of packet, it inspects label and PE1 determines whether label is the label for multicasting or not whether it is the label for unicasting or not (S321).

The number of source, which is included in the header of the packet received with reference to the VRF (S323) for the multicasting which oneself stores it removes label according to that (S322) it determines it is the packet which is received in the determination (S321) from the service supply apparatus (P1) label is the label for multicasting CE and CE setting up the multicast tree are determined (S324).

And in the determination (S324), the multicast number transmits packet with the single the corresponding CE (S328).

But if the multicast number determined is multiple, it reproduces the packet received as the number determined as described above and PE1 each transmits packet with corresponding CE (S325, S328).

In the meantime, if the label of being tested in the label check (S321) is the label for unicasting, after PE1 removes the label (S326) of being included in the header of packet, packet is transmitted with the destination location CE with reference to VRF for the unicasting which oneself stores (S328).

In the above, the technical spirit about the present invention was described with the attached view but it illustratively illustrates the preferred embodiment of the present invention but this does not limit the present invention. Moreover, it is the obvious fact that the deformation and the various emulation are possible in the range that is not to break away from the category of anyone or the technical spirit of the present invention if it grows up having the normal knowledge of this technical field.

#### Effect of Invention(Device)

The present invention has the effect that in the MPLS VPN, the traffic load can be reduced in the network of the service provider supporting the multicasting service in the service provider network and uses the unicast method.

Moreover, the present invention has the effect that in the service user inside network, the traffic load generated through the multiple unicasting can be reduced. The multicasting service in which it has the security can be provided through the multicasting which the service provider provides without the software providing the separate multiple unicasting function or the need to mount the hardware.

#### Scope of Claim(s)

##### Claim [1]

The method of providing multicasting at the MPLS VPN net of the multicasting service offer method at the MPLS VPN net including an plurality of CEs included in the member network, and a plurality of PEs and a plurality of service supply apparatuses belonging to the service provider network comprising the fifth step which transmits packet from the fourth stage which determines by using VRF for the multicasting which the information whether what is that source and multicasting tri of the received packet as described above are set up among the network device connected to the first PE is stored if the received packet is the multicast dragon in the second step: IP information determining in the first PE and determines in the second step or the third step: first PE which determines whether the packet which is received by using the label information is the multicast dragon or not whether it is the unicast dragon or not determines in the first step: first PE receiving the MPLS VPN packet by one first PE among a plurality of PEs whether the header information of the received packet is the IP information or not whether it is the label information and or not determines the receiving path whether the destination location where packet is transmitted is multiple or not whether it is the single or not and the first PE to the route of the related purpose paper after the destination location transmitted as described above reproduces as the number of destination location which transmits packet if it is multiple.

##### Claim [2]

The method of providing multicasting at the MPLS VPN net of claim 1, further comprising the step that uses VRF for the other network device connected to the first PE and the unicasting in which the routing information is recorded if the packet received with the determination of the third step is the unicast dragon and transmits packet with the related purpose paper.

##### Claim [3]

The multicasting service offer method at the MPLS VPN net of claim 1, wherein it determines in other words whether the IP information is recorded in the multicasting domain if the , header information is the IP information or not whether the packet which is received since it confirms whether the packet has in the unicasting domain or not is the multicasting dragon or the unicasting dragon: the header information is the label information: and it determines whether the packet which is received since it confirms whether label is the label for multicasting or not whether it is the label for unicasting or not is the multicasting dragon or the unicast dragon.

##### Claim [4]

The multicasting service offer method at the MPLS VPN net of claim 1, wherein in VRF for multicasting, content is changed with the , first PE: it decides on the time when content is changed to feature to be the primary time period, which the arbitrary CE registers as the transmitter of the multicasting population the second moment which the arbitrary CE registers as the receiver of the multicasting population, and the third time when the specific CE terminates role as the transmitter of the multicasting population and the fourth moment in which the , specific CE terminates role as the receiver of the multicasting population: and multicast tree are set up between two CEs when being satisfied the primary time period and the second moment and the exchange of data is made.

##### Claim [5]

The multicast tree establishment / termination method at the MPLS VPN net of the multicast tree establishment / termination method at the MPLS VPN net including an plurality of CEs included in the member network, and a plurality of PEs and a plurality of service supply apparatuses belonging to the service provider network, wherein the receiver of the multicast population the registration / the first CE the signal received from the first PE determines the signal acknowledgement for multicast in the receiver request stage: second PE receiving the receiver registration / termination requirement signal which is canceled in the second PE connected to the second CE from the first PE connected to the first CE to the receiver of the multicast population with the registration / are comprised of the transmitter registration acknowledgement step terminating the third CE in the receiver request stage: second PE receiving the transmitter registration / termination requirement signal which the receiver registration acknowledgement step: second PE informing the registration / termination fact by the first PE in the receiver registration / termination step: second PE requests to be canceled from the third CE to the transmitter



of the multicast population with the registration / to the transmitter of the multicast population with the registration / and informs the registration / termination fact by the third CE between the third CE and the first CE in the multicast tree establishment / termination step: terminating multicast tree with the establishment / and the second PE.

● Claim [6]

The multicast tree establishment / termination method at the MPLS VPN net of claim 5, wherein in the signal exchanged between the first PE, the second PE, the second PE and the third PE, data which inform thing called the multicast easiness if it is the thing about the , multicasting service are included in header.

● Claim [7]

The computerlegible medium which transmits packet from the fourth stage which determines by using VRF for the multicasting which the information whether what is that source and multicasting tri of the received packet as described above are set up among the network device connected to the first PE is stored if the received packet is the multicast dragon in the second step: IP information determining in the first PE and determines in the second step or the third step: first PE which determines whether the packet which is received by using the label information is the multicast dragon or not whether it is the unicast dragon or not determines in the first step: first PE receiving the MPLS VPN packet among a plurality of PEs by one first PE in computer whether the header information of the received packet is the IP information or not whether it is the label information and or not determines the receiving path whether the destination location where packet is transmitted is multiple or not whether it is the single or not and the first PE to the route of the related purpose paper after the destination location transmitted as described above reproduces as the number of destination location which transmits packet if it is multiple the program which the MPLS VPN net provides the multicast service is stored including the fifth step.

● Claim [8]

The computerlegible medium the signal received from the first PE determines the signal acknowledgement for multicast in the receiver request stage: second PE receiving the receiver registration / termination requirement signal which requests to computer to be canceled in the second PE connected to the second CE from the first PE connected to the first CE to the receiver of the multicast population with the registration /.

● Drawing



Drawing(s)



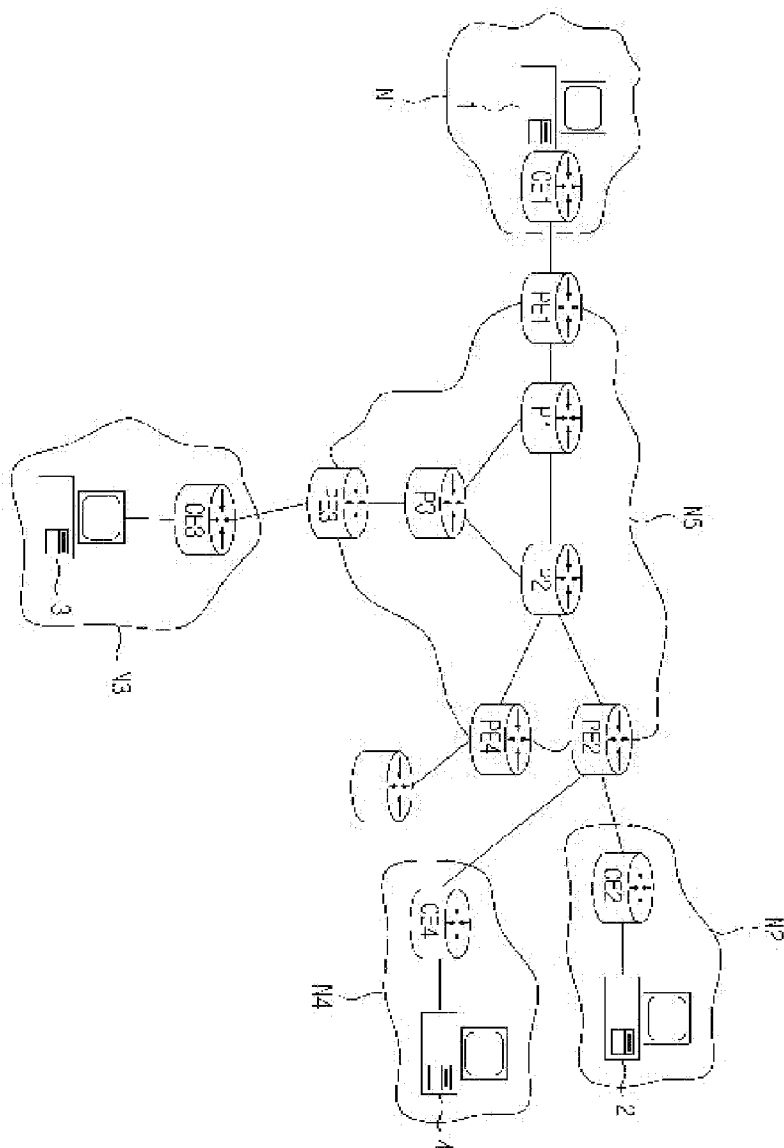


Figure 1

